

Vertical Height of the Atmosphere: Overview

Grade Level: 3-5

Description of the Lesson: This lesson is broken down into four activities. The recommended order for the activities is to complete the first two activities on day one and the second two activities on day two. Each day will require approximately 1 to 1 ½ hours.

Day One: "I. Vertical Distances" and "II. Vertical Profile of the Atmosphere"

Day Two: "III. Images of the Atmosphere" and "IV. CALIPSO Profile of the Atmosphere"

- The first activity is designed to help introduce concepts related to distance, including length and height and units of measurement. Students will be asked to make comparisons of distances.
- The second activity is designed to give students an understanding of the vertical profile of the atmosphere. Students will work with a graph and plot the heights of objects and the layers of the atmosphere (troposphere, stratosphere, mesosphere, thermosphere, and exosphere).
- The third activity is designed to help students understand other forms of visual displays using satellite imagery. Students will compare images of the same weather feature, a hurricane, using two different images. One image is looking down on the hurricane from space, the other looks through the hurricane to display a profile of the hurricane.
- The fourth activity is designed to reinforce the concept of the vertical nature of the atmosphere. Students will take a satellite image that shows a profile of the atmosphere and use this information to plot mountains and clouds on their own graph of the atmosphere.

Lesson	National Standards	Virginia Standards of Learning
I. Vertical Distances	Math: measurement Science Content: A, D	Science: 3.1, 4.1, 5.1 (6.1, ES 12 & 13)*
II. Vertical Profile of the Atmosphere	Math: measurement Science Content: A, D	Math: 3.17, 4.7, 4.14, 4.17 Science: 3.1, 4.1, 5.1 (6.1, ES 12 & 13)*
III. Images of the Atmosphere	Math: measurement Science Content: A, D Geography: World in Spatial terms	Science: 3.1, 4.1, 5.1 (6.1, ES 12 & 13)*
IV. CALIPSO Profile of the Atmosphere	Math: measurement Science Content: A, D Geography: World in Spatial terms	Math: 3.17, 4.7, 4.14, 5.8 Science: 3.1, 4.1, 5.1 (6.1, ES 12 & 13)*

*Denotes use in other grades

Lesson Links:

The Layers of the Earth's Atmosphere:

http://airs.jpl.nasa.gov/maps/satellite_feed/atmosphere_layers/

Layers of the Atmosphere Interactive Game

<http://calipsooutreach.hamptonu.edu/arcade.html>

Additional Resources on Comparing Heights and Graphing (Early Algebra Early Arithmetic):

<http://www.earlyalgebra.terc.edu/materials.htm>

"NASA Facts- CALIPSO: Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations"

http://www.nasa.gov/pdf/137028main_FS-2005-09-120-LaRC.pdf

CALIPSO Homepage:

<http://www-calipso.larc.nasa.gov/>

NASA Missions- CALIPSO Main Page:

http://www.nasa.gov/mission_pages/calipso/main/index.html

Orbits 'R' Us! (NASA Space Place):

http://spaceplace.nasa.gov/en/kids/goes/goes_poes_orbits.shtml

Satellites and Space (NOAA Education):

<http://www.education.noaa.gov/tSPACE.html>